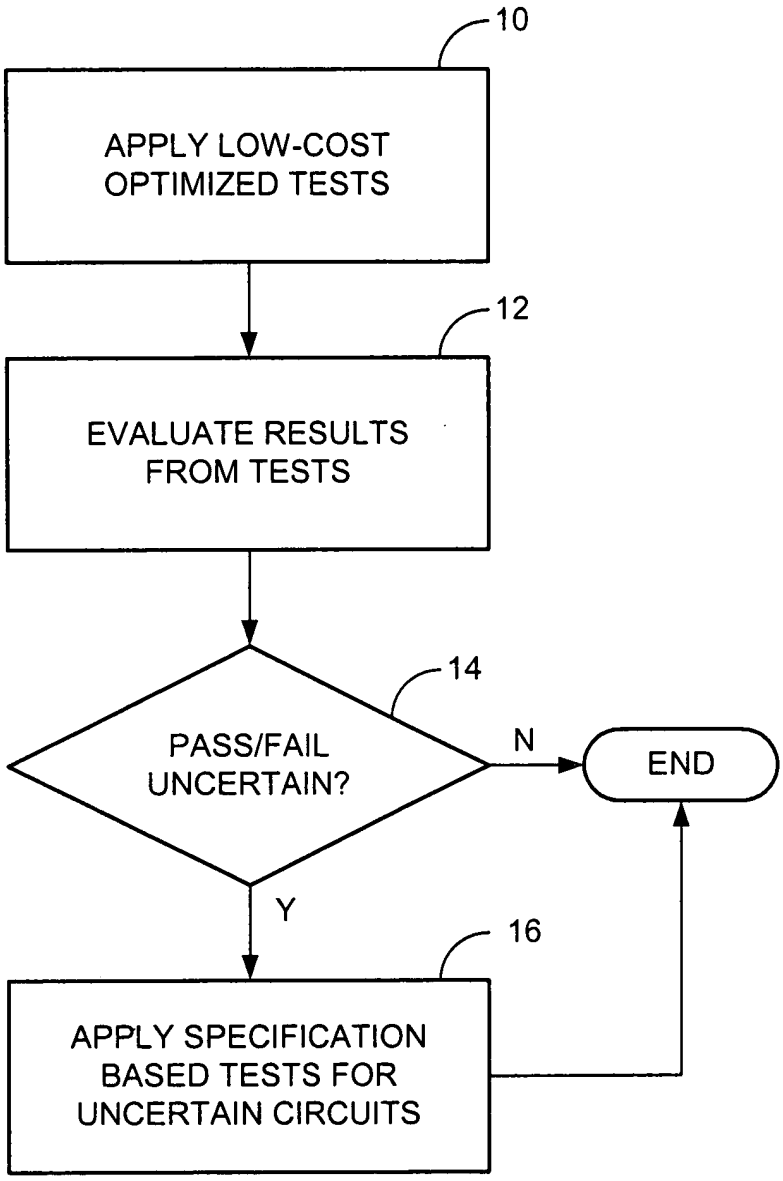
10
APPLY LOW-COST OPTIMIZED TESTS
12
EVALUATE RESULTS FROM TESTS
14
PASS/FAIL UNCERTAIN?
N
END
Y
16
APPLY SPECIFICATION BASED TESTS FOR UNCERTAIN CIRCUITS

FIG. 1

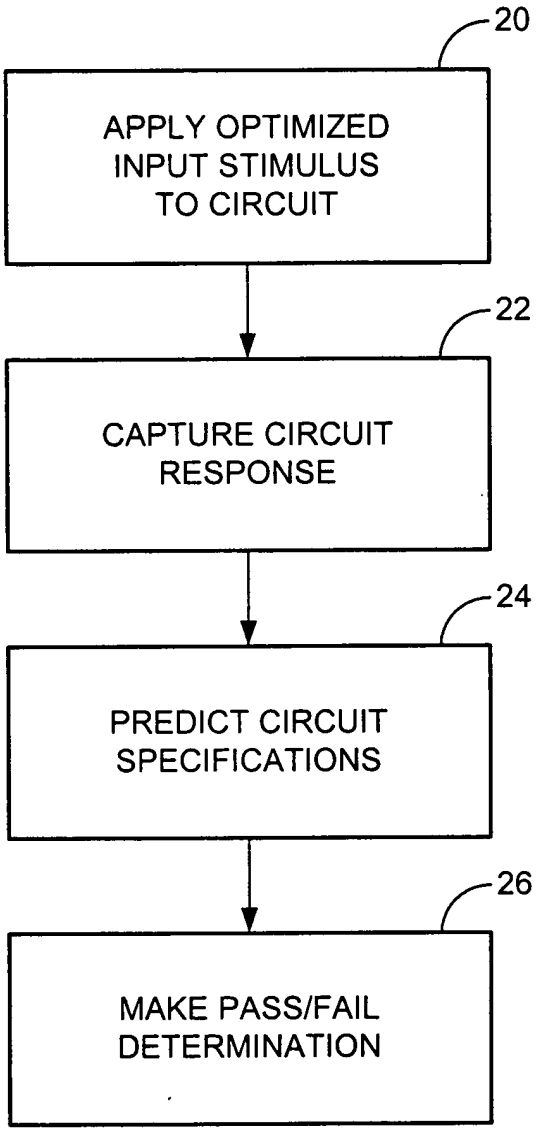
20
APPLY OPTIMIZED INPUT STIMULUS TO CIRCUIT
22
CAPTURE CIRCUIT RESPONSE
24
PREDICT CIRCUIT SPECIFICATIONS
26
MAKE PASS/FAIL DETERMINATION

FIG. 2

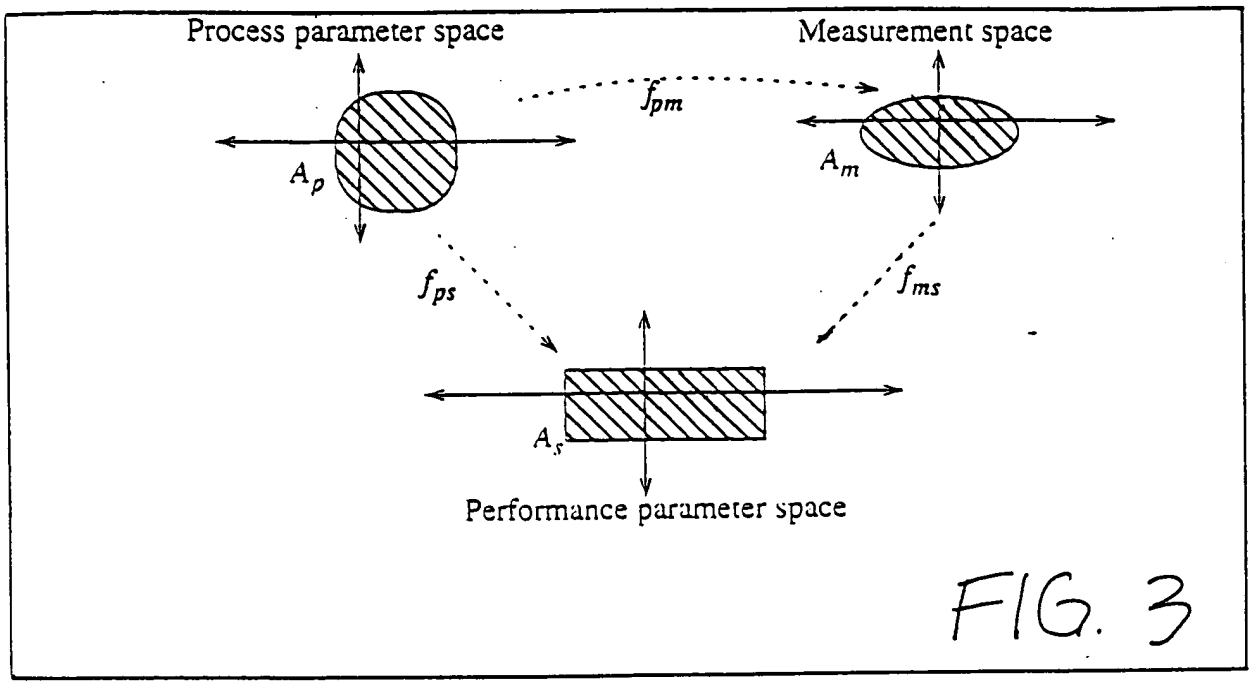
Process parameter space
Measurement space
f_{pm}
A_p
A_m
f_{ps}
f_{ms}
A_s
Performance parameter space

FIG. 3

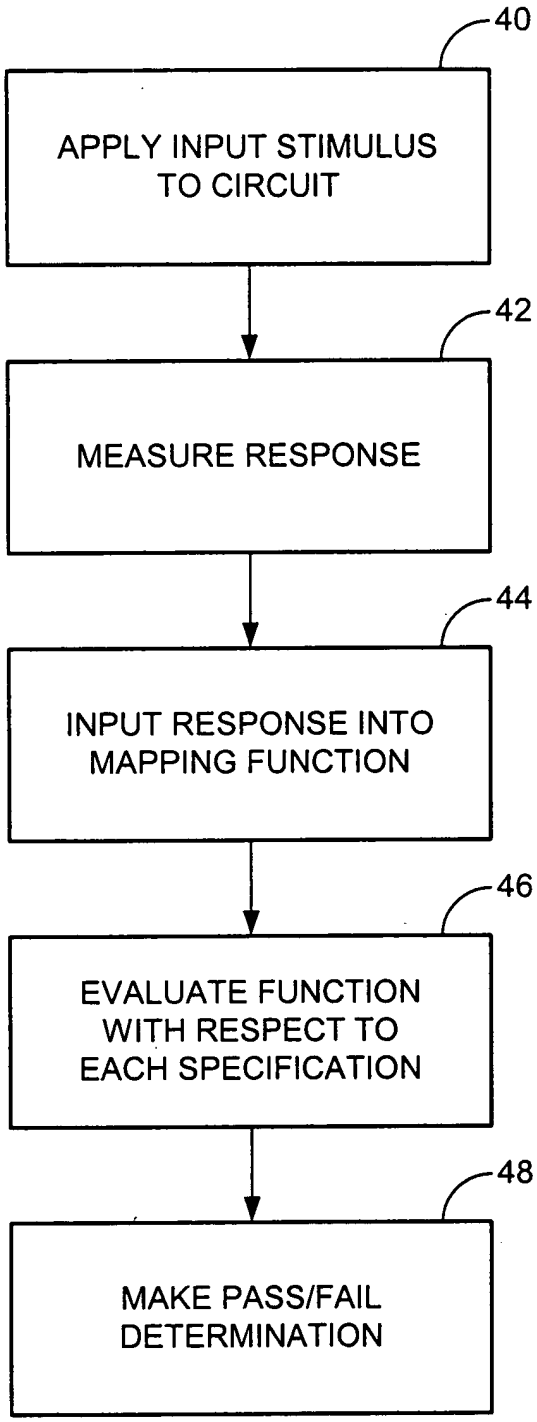
40
APPLY INPUT STIMULUS TO CIRCUIT
42
MEASURE RESPONSE
44
INPUT RESPONSE INTO MAPPING FUNCTION
46
EVALUATE FUNCTION WITH RESPECT TO EACH SPECIFICATION
48
MAKE PASS/FAIL DETERMINATION

FIG. 4

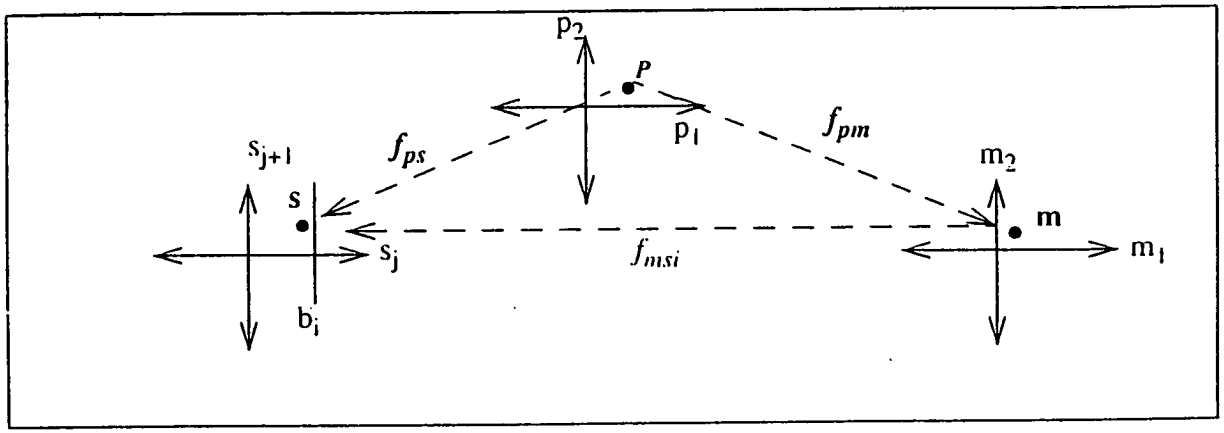

FIG. 5

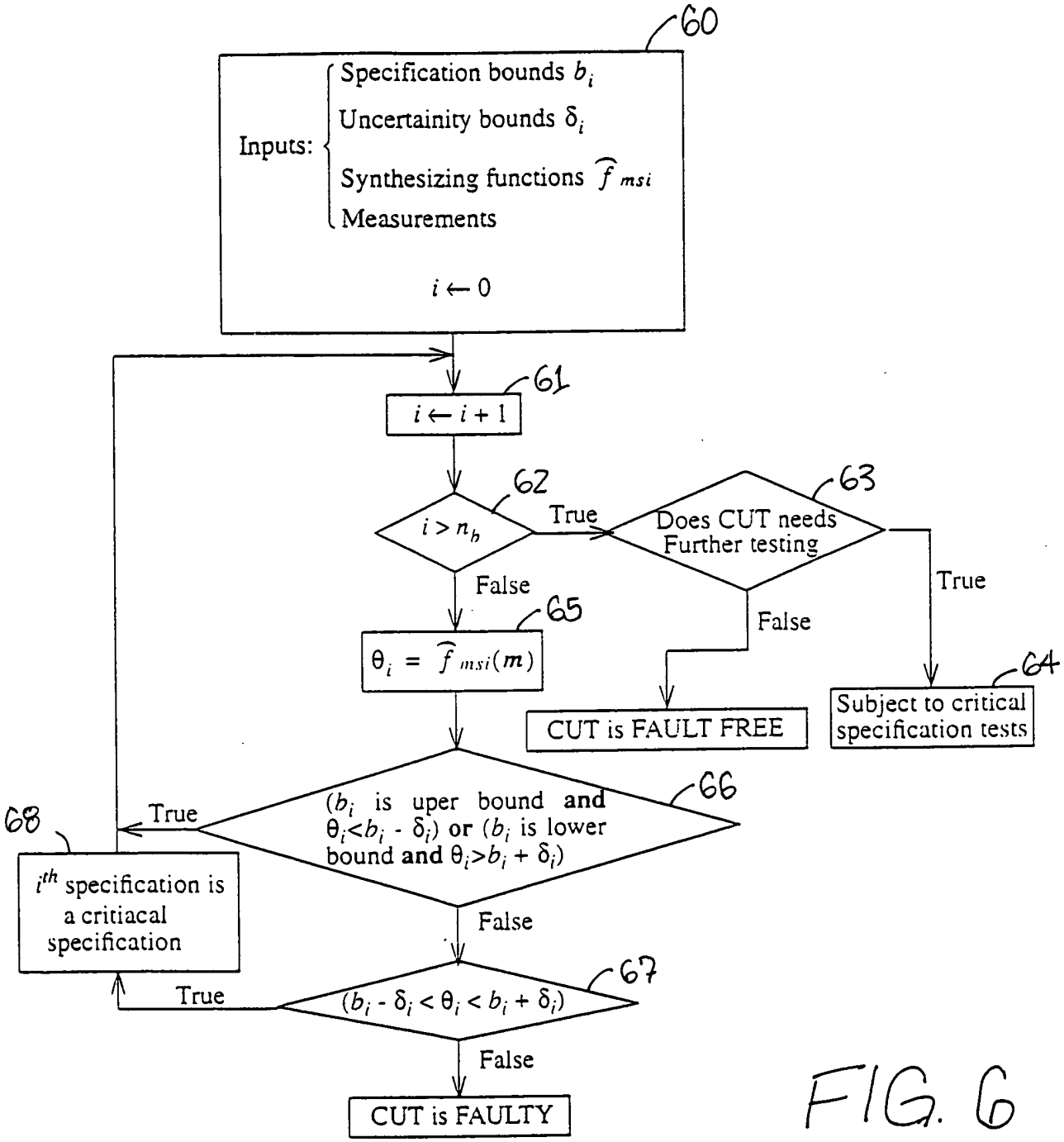
60
Inputs:
Specification bounds b_i
Uncertainity bounds δ_i
Synthesizing functions $\hat{f}_{msi}$
Measurements
$i \leftarrow 0$
61
$i \leftarrow i + 1$
62
$i > n_h$
True
63
Does CUT needs Further testing
True
False
False
65
$\theta_i = \hat{f}_{msi}(m)$
64
Subject to critical specification tests
CUT is FAULT FREE
66
(b_i is uper bound **and** $\theta_i < b_i - \delta_i$) **or** ($b_i$ is lower bound **and** $\theta_i > b_i + \delta_i$)
68
True
i^{th} specification is a critiacal specification
False
67
$(b_i - \delta_i < \theta_i < b_i + \delta_i)$
True
False
CUT is FAULTY

FIG. 6

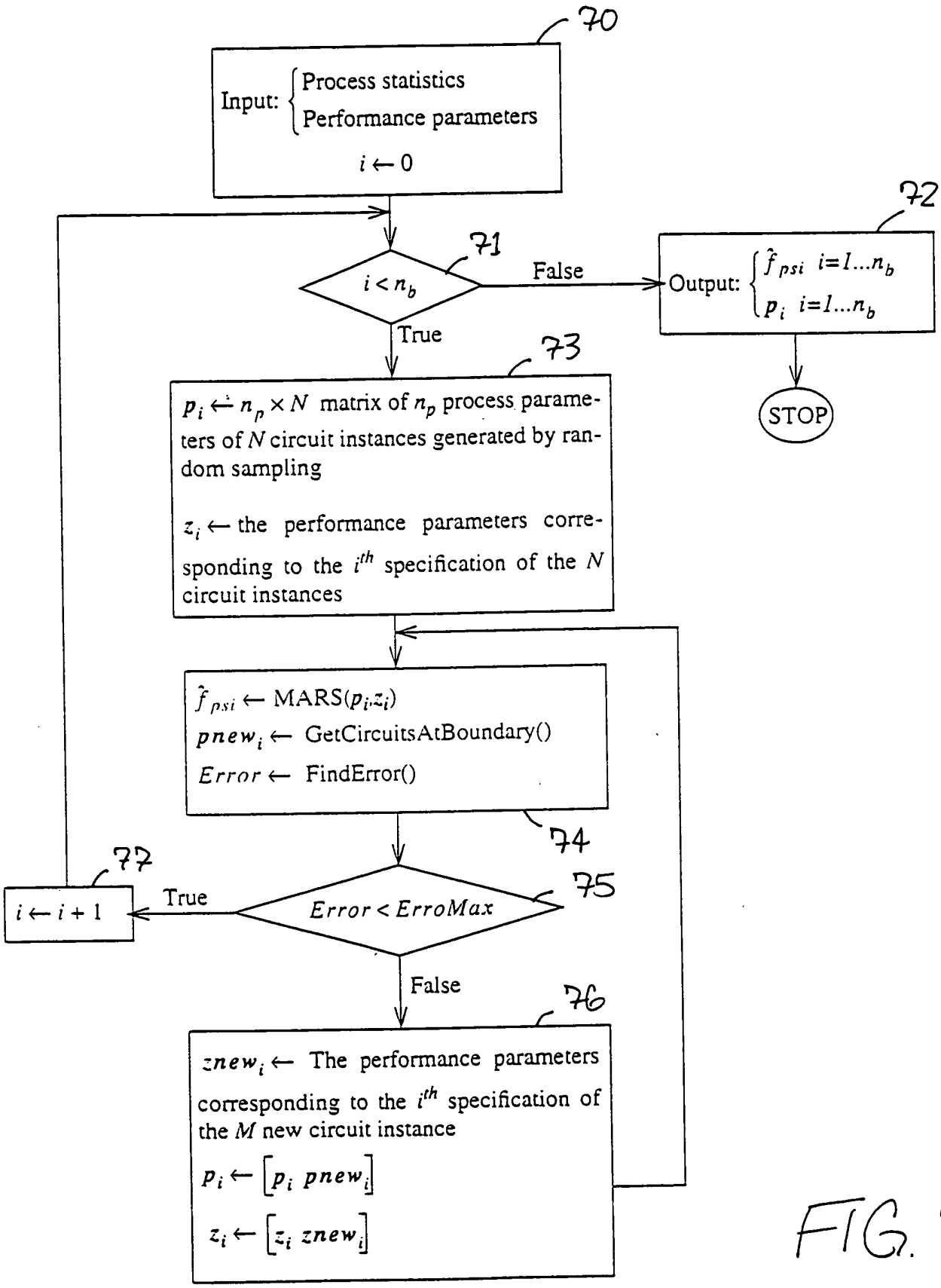
70
Input: Process statistics
Performance parameters
$i \leftarrow 0$
71
$i < n_b$
False
72
Output: $\hat{f}_{psi}$ $i=1...n_b$
p_i $i=1...n_b$
True
STOP
73
$p_i \leftarrow n_p \times N$ matrix of n_p process parameters of N circuit instances generated by random sampling
$z_i \leftarrow$ the performance parameters corresponding to the i^{th} specification of the N circuit instances
$\hat{f}_{psi} \leftarrow$ MARS(p_i,z_i)
$pnew_i \leftarrow$ GetCircuitsAtBoundary()
$Error \leftarrow$ FindError()
74
75
$Error < ErroMax$
True
77
$i \leftarrow i + 1$
False
76
$znew_i \leftarrow$ The performance parameters corresponding to the i^{th} specification of the M new circuit instance
$p_i \leftarrow [p_i \; pnew_i]$
$z_i \leftarrow [z_i \; znew_i]$

FIG. 7

Procedure OrderMeasurements

01 **for** each i^{th} single ended specification

02 **for** each measurement

03 remove the measurement from the list of independent variable

04 derive the synthesizing function using MARS. Use the training set generated by GenerateTrainSet to train MARS

05 Calculate the variance σ_{ei}^2.

06 **end for**

07 Order the measurements in the acending order of σ_{ei}^2.

08 **end for**

Procedure SelectMeasurements

01 **for** each single ended specification

02 Selected measurements = Φ

03 **repeat**

04 Add the measurement with lowest σ_{ei}^2 to the set of selected measurements.

Use the ordered list of measurements generated by OrderMeasurements

05 Derive the synthesizing function with the selected set of measurements

06 Calculate the variance σ_{ei}^2

07 **until** σ_{ei}^2 start increasing.

08 **end for**

FIG. 8

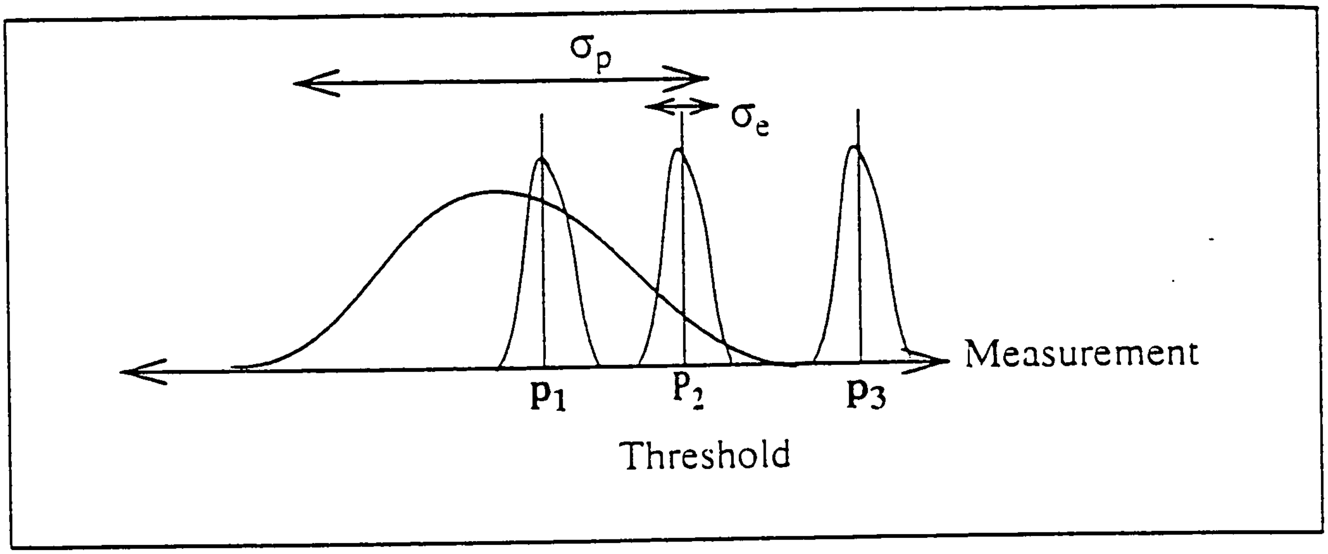

FIG. 9

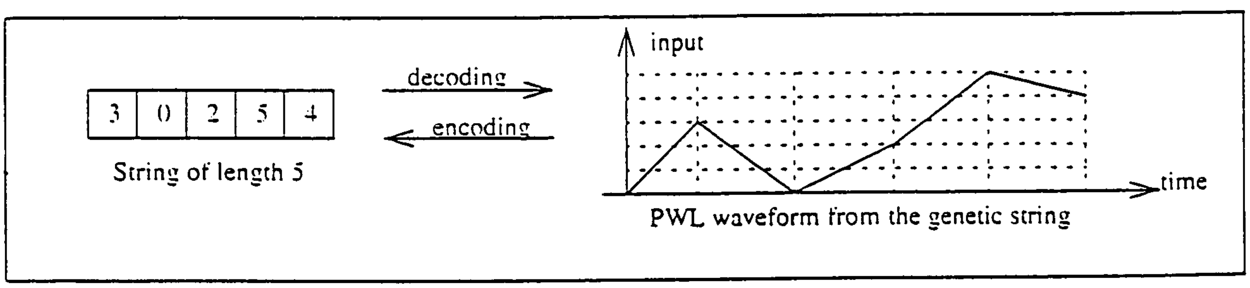

FIG. 10

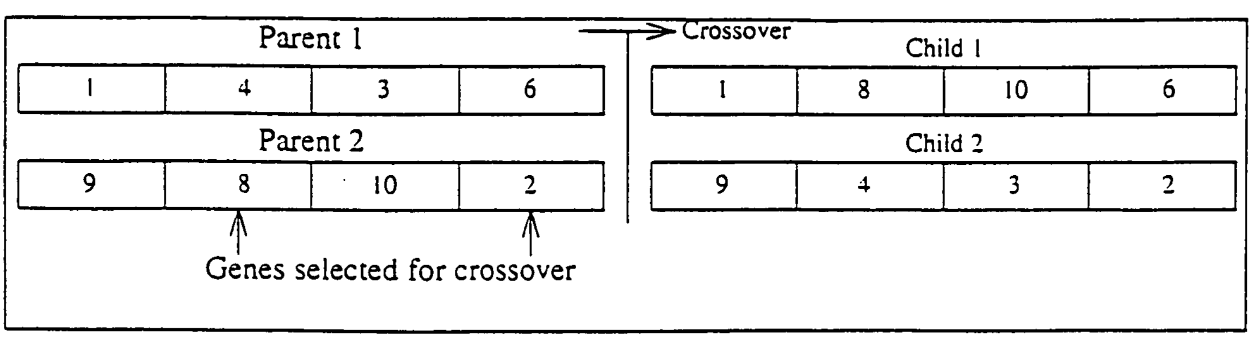

FIG. 11